

**CLAIMS:**

What is claimed is:

1 1. A data flow control method within a data switch having at  
2 least one input section which includes an input buffer from  
3 which said input section transmits data to an output section  
4 through a switching fabric, said data flow control method  
5 comprising the steps of:

6 pausing data transmission from said input section to said  
7 output section in response to a detection of congestion within  
8 said switching fabric or within said output section;

9 determining input buffer occupancy of said input section  
10 during said pause; and

11 delaying restart of data transmission from said input  
12 section to said output section in accordance with said  
13 determined input buffer occupancy.

1 2. The data flow control method of claim 1, wherein said data  
2 switch further includes an output buffer within said output  
3 section and switching fabric for routing data from said input  
4 section to said output section, and wherein said step of  
5 pausing data transmission from said input section is preceded  
6 by the steps of:

7 detecting a congested condition within said output buffer;  
8 and

9 in response to said detection of a congested condition  
10 within an output buffer, generating a backpressure signal  
11 within said switch fabric.

1 3. The data flow control method of claim 2, wherein said step  
2 of detecting a congested condition within said output buffer  
3 comprises detecting a backpressure signal from said switching  
4 fabric.

1 4. The data flow control method of claim 3, wherein said step  
2 of pausing data transmission from said input section is  
3 initiated in response to said input section receiving said  
4 backpressure signal.

1 5. The data flow control method of claim 2, wherein said  
2 detection of congestion within said output buffer comprises the  
3 step of detecting a high level of occupancy within said output  
4 buffer.

1 6. The data flow control method of claim 5, further  
2 comprising the steps of:

3 monitoring said output buffer for an indication of  
4 congestion;

5 detecting an indication of congestion within said output  
6 buffer;

7 generating a congestion indication signal in response to  
8 said step of detecting an indication of congestion;

9 delivering said congestion indication signal from said  
10 switching fabric to said input section; and

11 pausing data transmission from said input section to said  
12 output section in response to said delivery of said congestion  
13 indication signal.

1 7. The data flow control method of claim 1, wherein said step  
2 of delaying restart of data transmission further comprises  
3 computing a delay interval.

1 8. The data flow control method of claim 7, wherein the  
2 duration of said computed delay interval varies inversely with  
3 said determined input buffer occupancy.

1 9. The data flow control method of claim 1, further  
2 comprising the step of defining a plurality of occupancy  
3 levels, including a high level and a low level, each uniquely  
4 corresponding to a range of readable buffer occupancy values.

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1 12. The data flow control method of claim 10, wherein said  
2 data switch further comprises an intelligent control device,  
3 and wherein said step of determining input buffer occupancies  
4 further comprises the steps of:

5 in a periodic manner within said intelligent control  
6 device:

7 reading an input buffer occupancy value for each of  
8 said plurality of input sections;

9 associating each of said input section buffer  
10 occupancy values with a buffer occupancy level; and

11 assigning said occupancy levels to corresponding  
12 input sections.

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1 13. A data flow control system within a data switch having  
2 at least one input section which includes an input buffer from  
3 which said input section transmits data to an output section  
4 through a switching fabric, said data flow control system  
5 comprising:

6 means for pausing data transmission from said input  
7 section to said output section in response to a detection of  
8 congestion within said switching fabric or within said output  
9 section;

10 means for determining input buffer occupancy of said input  
11 section during said pause; and

12 means for delaying restart of data transmission from said  
13 input section to said output section in accordance with said  
14 determined input buffer occupancy.

1 14. The data flow control system of claim 13, wherein said  
2 data switch further includes an output buffer within said  
3 output section and switching fabric for routing data from said  
4 input section to said output section, and wherein said means  
5 for pausing data transmission from said input section further  
6 comprises:

7 means for detecting a congested condition within said  
8 output buffer; and

9 means for generating a backpressure signal within said  
10 switch fabric in response to detecting a congested condition  
11 within an output buffer.

12 15. The data flow control system of claim 14, wherein said  
13 means for detecting a congested condition within said output  
14 buffer comprises means for detecting a backpressure signal from  
15 said switching fabric.

16 16. The data flow control system of claim 15, wherein said  
17 means for pausing data transmission from said input section is  
18 initiated in response to said input section receiving said  
19 backpressure signal.

20 17. The data flow control system of claim 14, wherein said  
21 means for detecting congestion within said output buffer  
22 comprises means for detecting a high level of occupancy within  
23 said output buffer.

1 18. The data flow control system of claim 17, further  
2 comprising:

3 means for monitoring said output buffer for an indication  
4 of congestion;

5 means for detecting an indication of congestion within  
6 said output buffer;

7 means for generating a congestion indication signal in  
8 response to detecting an indication of congestion;

9 means for delivering said congestion indication signal  
10 from said switching fabric to said input section; and

11 means for pausing data transmission from said input  
12 section to said output section in response to delivering said  
13 congestion indication signal.

14 19. The data flow control system of claim 13, wherein said  
15 means for delaying restart of data transmission further  
16 comprises means for computing a delay interval.

17 20. The data flow control system of claim 19, wherein the  
18 duration of said computed delay interval varies inversely with  
19 said determined input buffer occupancy.

20 21. The data flow control system of claim 13, further  
21 comprising a plurality of defined occupancy levels, including  
22 a high level and a low level, each uniquely corresponding to a  
23 range of readable buffer occupancy values.

1 22. The data flow control system of claim 21, wherein said  
2 data switch includes a plurality of input sections transmitting  
3 data to said congested output buffer, said system further  
4 comprising:

5 means for pausing data transmission from said input  
6 sections to said output section in response to a detection of  
7 congestion within said switching fabric or within said output  
8 section; and

9 means for determining buffer occupancies of each of said  
10 input buffers during said pause.

11 23. The data flow control system of claim 22, wherein said  
12 means for determining input buffer occupancies during said  
13 pause comprises:

14 means for reading an exact input buffer occupancy value  
15 for each of said input sections; and

16 means for assigning one of said occupancy levels to each  
17 of said input sections in accordance with said occupancy level  
18 definitions.



24. The data flow control system of claim 22, wherein said data switch further comprises an intelligent control device, and wherein said means for determining input buffer occupancies further comprises:

means for reading an input buffer occupancy value for each of said plurality of input sections;

means for associating each of said input section buffer occupancy values with a buffer occupancy level; and

means for assigning said occupancy levels to corresponding input sections.